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Research Article

Revision of the orb-weaving spider genus *Yaginumia* Archer, 1960 (Araneae, Araneidae) from China

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Abstract

The orb-weaver spider genus *Yaginumia* Archer, 1960 from China is revised, and three species, including two new species, are recognized: *Y. medog* Mi & Wang, **sp. nov.** (♂♀) from Xizang and *Y. qiong* Mi & Wang, **sp. nov.** (♂♀) from Hainan; the type species, *Y. sia* (Strand, 1906) (♂♀), is redescribed based on specimens from Guizhou and Hubei. A distributional map of the studied specimens is also provided.

Key words: Arachnida, diagnosis, identification key, morphology, new species, taxonomy

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Introduction

The orb-weaver spider genus *Yaginumia* Archer, 1960 was established by Archer (1960) to accommodate the type species *Y. sia* (Strand, 1906). This species was first described as a member of the genus *Araneus* Clerck, 1757 under the subgenus *Zilla* C.L. Koch, 1834 (Bösenberg and Strand 1906); then it was transferred to the genus *Zygiella* F.O. Pickard-Cambridge, 1902 by Roewer (1942) without any justification; Saitō (1959) returned it to the genus *Zilla*, again without justification. Levi (1974) treated it in *Zygiella*, but pointed to two characters that are unusual for typical *Zygiella* species, such as the wider spacing of the eyes and the cap on the embolus. Consequently, most subsequent taxonomic studies placed this species in the genus *Yaginumia* (WSC 2024). Several studies using traditional Sanger sequencing revealed that this genus was closely related to the genus *Guizygiella* Zhu, Kim & Song, 1997 (Gregorič et al. 2015; Kallal and Hormiga 2018; Kallal et al. 2020).

Yaginumia sia (Strand, 1906) always lives close to humans in and around houses, other buildings, rice fields and cotton fields. It is widely distributed in China (Lee 1966; Yin 1978; Song 1980; Hu 1984; Guo 1985; Zhang 1987; Chen and Gao 1990; Feng 1990; Chen and Zhang 1991; Zhao 1993, 1995; Yin et al. 1997, 2012; Song et al. 1999; Zhu and Zhang 2011), Japan (Bösenberg and Strand 1906; Roewer 1942; Saitō 1959; Archer 1960; Yaginuma 1960, 1971, 1986; Levi 1974; Ishinoda 1989; Baba and Tanikawa 2015; Tanikawa 2007;

2009) and Korea (Namkung et al. 1972; Chikuni 1989; Namkung 2002, 2003; Kim and Cho 2002; Kim and Kim 2002; Kim and Lee 2012).

Yaginumia specimens deposited in the Museum of Tongren University were examined, and three species, including two new species, were identified. They are described in this paper, and a key to the species is provided.

Material and methods

All specimens were collected by beating shrubs during the daytime or direct searching at night and are preserved in 75% ethanol. The specimens are deposited in the Museum of Tongren University, China (**TRU**). Methods follow Mi et al. (2023).

All measurements are given in millimeters. Leg measurements are given as total length (femur, patella + tibia, metatarsus, tarsus). Abbreviations used in the text and figures are as follows: **ALE** anterior lateral eye; **AME** anterior median eye; **C** conductor; **CD** copulatory duct; **CO** copulatory opening; **E** embolus; **FD** fertilization duct; **MA** median apophysis; **MOA** median ocular area; **Pc** paracymbium; **PLE** posterior lateral eye; **PME** posterior median eye; **Sp** spermatheca; **TA** terminal apophysis; **TP** tegular projection.

Taxonomy

Key to species of the genus *Yaginumia*

1 Male.....**2**
– Female.....**4**
2 Median apophysis with projection on middle part (Fig. 6A)..... ***Yaginumia sia***
– Median apophysis lacking projection on middle part (Figs 2A, 4A) **3**
3 Median apophysis curled about 90° in ventral view (Fig. 2A) ..... ***Y. medog* Mi & Wang, sp. nov.**
– Median apophysis curled about 45° in ventral view (Fig. 4A) ..... ***Y. qiong* Mi & Wang, sp. nov.**
4 Copulatory openings arcuate (Fig. 1A) ..... ***Y. medog* Mi & Wang, sp. nov.**
– Copulatory openings almost rounded (Figs 3A, 5A) **5**
5 Scape heart-shaped (Fig. 5B) ..... ***Y. sia***
– Scape tongue-shaped (Fig. 3B) ..... ***Y. qiong* Mi & Wang, sp. nov.**

Family Araneidae Clerck, 1757

Genus *Yaginumia* Archer, 1960

Yaginumia Archer, 1960: 14.

Type species. *Aranea sia* Strand, 1906.

Diagnosis. *Yaginumia* resembles *Guizygiella* and *Zygiella* in having a dorsoventrally flattened elliptical abdomen with almost symmetrical dorsal folium, and, in males, an enlarged paracymbium. It can be distinguished from *Guizygiella* by: 1) with triangular, toothed tegular projection (Figs 2A–E, 4A–E, 6A–E) vs absent (Zhu et al. 2003: fig. 20I, J); 2) tibia of pedipalp at least 1.5 × longer than wide in ventral view (Figs 2C, 4C, 6C) vs about equal in length and width (Zhu et

al. 2003: fig. 20I); 3) epigyne with a scape (Figs 1A–D, 3A–D, 5A–D) vs lacking (Zhu et al. 2003: fig. 20F); and 4) abdomen bearing dense setae (Figs 1E–J, 3E–J, 5E–J) vs sparse setae (Zhu et al. 2003: fig. 20A). It differs from *Zygiella* by: 1) pedipalp of male with two patellar bristles (2A, B, 4A, B, 6A, B) vs only one patellar bristle (Levi 1974: 271); 2) long axis of tegulum in "horizontal" position in ventral view (Figs 2C, 4C, 6C) vs in "vertical" position (Levi 1974: figs 28, 29); 3) distance of PME–PLE is at least 3.6 × to that of PME–PME (Figs 1E, H, 3E, H, 5E, H) vs posterior eyes almost equal separated (Levi 1974: figs 26, 57); 4) abdomen bearing dense setae (Figs 1E–J, 3E–J, 5E–J) vs sparse setae (Levi 1974: fig. 26); and 5) web complete vs with a vacant sector.

Description. Medium spiders with female total length of 4.25–13.10 and male total length of 3.15–8.20. Carapace pear-shaped, yellow to dark brown, darker in cephalic region than in thoracic region, fovea transverse. Endites wider than long. Labium triangular, swollen. Sternum cordiform. Legs yellow, always with dark annuli (except *Y. medog* sp. nov.). Abdomen elliptical, dorsum bearing dense setae, with dark median longitudinal folium. Ventral abdomen yellow to yellowish-gray with pale line on each side.

Pedipalp of male with two patellar bristles; tibia at least 1.5 × longer than wide; paracybium enlarged at base with small distal lobe; tegular projection almost triangular in ventral view, with toothed inner edge; median apophysis tapered distally; embolus short and slightly curved, almost totally covered by terminal apophysis; conductor membranous or weakly sclerotized; terminal apophysis prominent, weakly sclerotized, curved distally in ventral view.

Epigyne heavily sclerotized, wider than long in ventral view, with scape, the scape always torn off; copulatory openings situated on ventral surface; copulatory ducts twisted, about equal length to spermathecal diameter; spermathecae rounded, touching or nearly touching.

Composition. *Yaginumia medog* Mi & Wang, sp. nov., *Y. qiong* Mi & Wang, sp. nov. and *Y. sia* (Strand, 1906) (type species).

Distribution. East Asia (China, Japan, Korea).

Yaginumia medog Mi & Wang, sp. nov.

https://zoobank.org/5c95f73b-85c3-4919-8ffa-0231534a89ef

Figs 1, 2, 7

Type material. ***Holotype*:** China • ♂; Xizang Autonomous Region, Medog County, Beibeng Township, De'ergong Village; 29°10.84'N, 95°8.67'E; ca 1670 m elev.; 25.V.2024; X.Q. Mi et al. leg.; TRU-Araneidae-326. ***Paratypes*:** 2♀♀; same data as for holotype; TRU-Araneidae-327–328.

Etymology. The species name is a noun derived from the type locality: Medog County.

Diagnosis. The new species resembles *Y. qiong* sp. nov. in appearance and genitalia structures, but it can be distinguished as follows: 1) median apophysis strongly curled about 90° in ventral view (Fig. 2C) vs slightly curled about 45° (Fig. 4C); 2) basal part of paracybium ~2.1 × wider than distal part in retrolateral view (Fig. 2B) vs ~3.4 × wider (Fig. 4B); 3) copulatory openings arcuate (Fig. 1A) vs almost rounded (Fig. 3A); 4) spermathecae touching to each other (Fig. 1C, D) vs separated (Fig. 3C, D); and 5) legs with annuli (Fig. 1E, H) vs lacking (Fig. 3E, H).

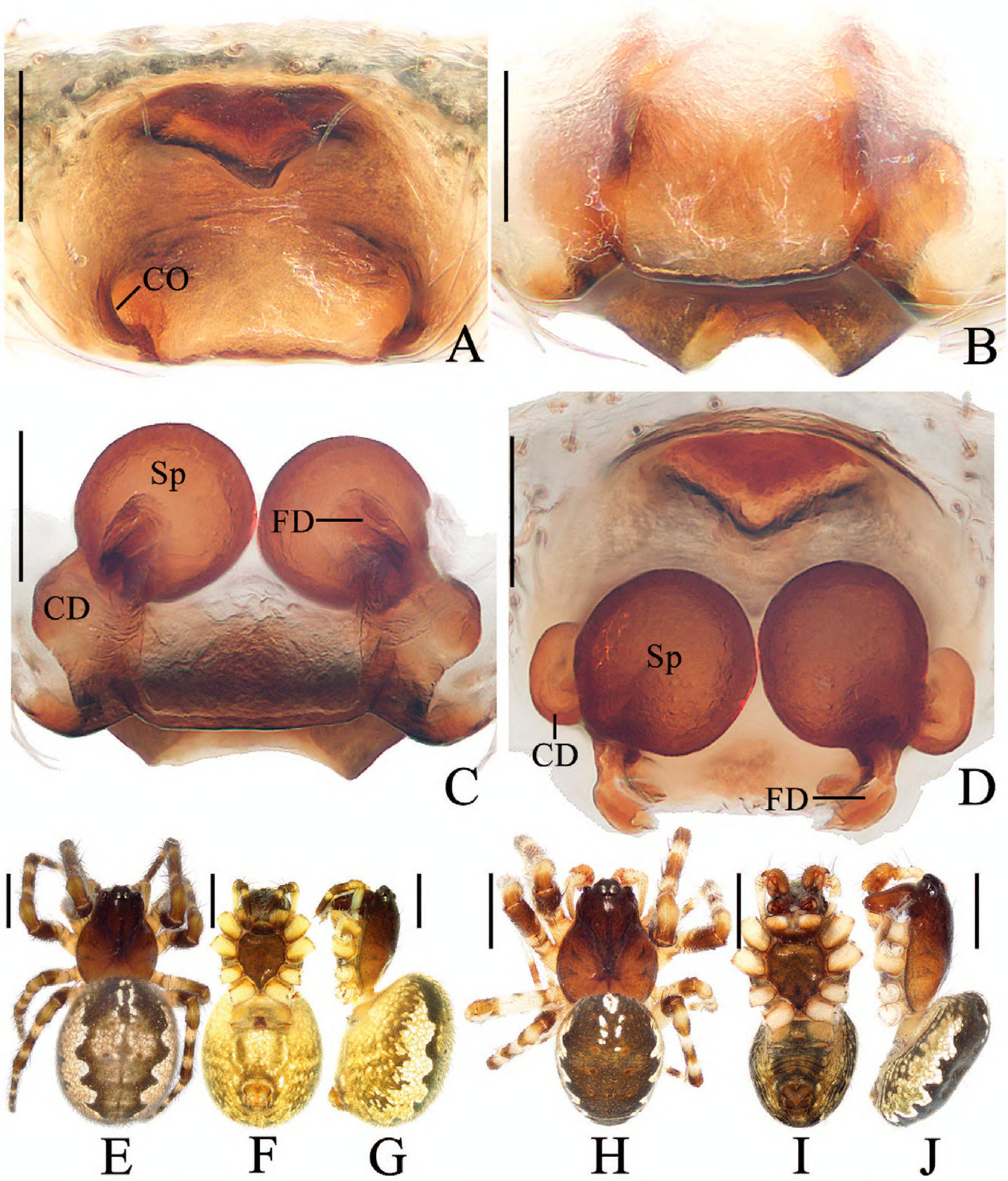

Figure 1. *Yaginumia medog* Mi & Wang, sp. nov. **A–G** female paratype TRU-Araneidae-327 **H–J** male holotype **A** epigyne, ventral view **B** ibid., posterior view **C** vulva, posterior view **D** ibid., dorsal view **E, H** habitus, dorsal view **F, I** ibid., ventral view **G, J** ibid., lateral view. Abbreviations: CD copulatory duct, CO copulatory opening, FD fertilization duct, Sp spermatheca. Scale bars: 0.1 mm (**A–D**); 1.0 mm (**E–J**).

Description. Male (holotype, Figs 1H–J, 2). Total length 3.20. Carapace 1.85 long, 1.35 wide. Abdomen 2.10 long, 1.45 wide. Clypeus 0.05 high. Eye sizes and interdistances: AME 0.13, ALE 0.08, PME 0.10, PLE 0.08, AME–AME 0.10, AME–ALE 0.10, PME–PME 0.05, PME–PLE 0.18, MOA length 0.30, anterior

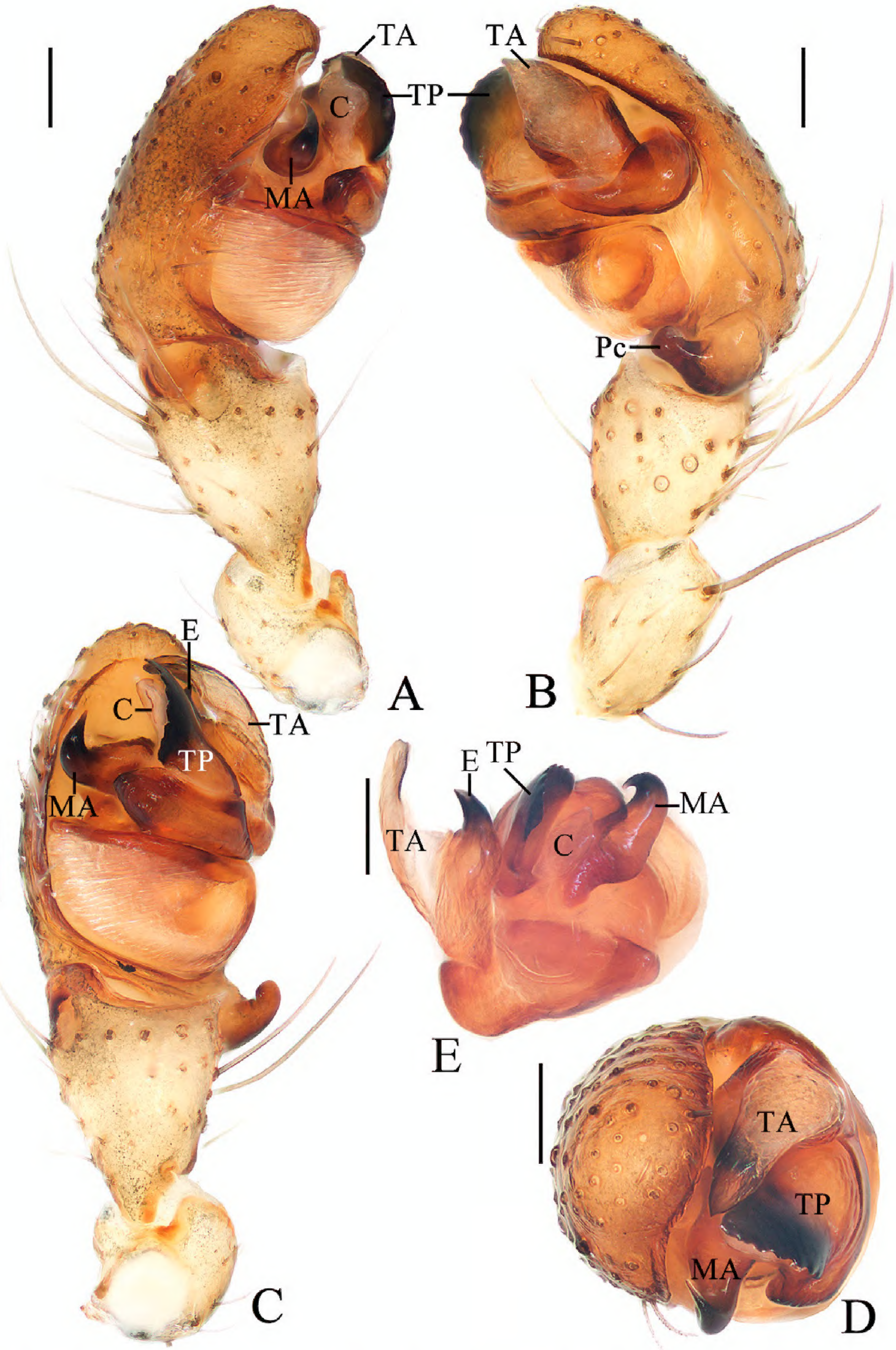

Figure 2. *Yaginumia medog* Mi & Wang, sp. nov. male holotype **A** pedipalp, prolateral view **B** ibid., retrolateral view **C** ibid., ventral view **D** ibid., apical view **E** part of expanded bulb. Scale bars: 0.1 mm. Abbreviations: C conductor, E embolus, MA median apophysis, Pc paracymbium, TA terminal apophysis, TP tegular projection.

width 0.33, posterior width 0.25. Leg measurements: I 6.65 (1.85, 2.40, 1.70, 0.70), II 5.70 (1.60, 2.05, 1.40, 0.65), III 3.50 (1.10, 1.10, 0.75, 0.55), IV 4.55 (1.40, 1.55, 1.10, 0.50). Carapace dark brown in cephalic region and yellowish-brown in thoracic region. Cervical groove conspicuous. Chelicerae dark brown, with four promarginal and three retromarginal teeth. Endites and labium dark brown at base, with paler tip. Sternum dark brown. Legs yellow with brown annuli. Abdomen ~1.45 × longer than wide, dorsal folium extended from anterior to posterior, grayish-brown with white spots anteriorly. Venter abdomen yellow to yellowish-brown. Spinnerets yellowish-brown.

Pedipalp (Fig. 2): tibia ~1.78 × longer than wide in ventral view; paracybium enlarged at base and lobe-like distally; tegular projection triangular, with toothed inner edge; median apophysis tapered and curled about 90° distally in ventral view; embolus almost straight, shorter than conductor; conductor membranous; terminal apophysis weakly sclerotized, covering embolus.

Female (paratype TRU-Araneidae-327, Fig. 1A–G). Total length 4.55. Carapace 2.10 long, 1.55 wide. Abdomen 2.90 long, 2.30 wide. Clypeus 0.05 high. Eye sizes and interdistances: AME 0.13, ALE 0.08, PME 0.13, PLE 0.08, AME–AME 0.13, AME–ALE 0.08, PME–PME 0.05, PME–PLE 0.20, MOA length 0.33, anterior width 0.35, posterior width 0.28. Leg measurements: I 6.75 (2.00, 2.45, 1.55, 0.75), II 5.80 (1.75, 2.05, 1.30, 0.70), III 3.85 (1.25, 1.30, 0.75, 0.55), IV 5.30 (1.70, 1.85, 1.15, 0.60). Habitus similar to that of male.

Epigyne (Fig. 1A–D): ~1.57 × wider than long in ventral view; copulatory openings arcuate, situated on ventral surface; copulatory ducts twisted, about equal length to spermathecal diameter; spermathecae rounded, touching.

Variation. Total length: ♀♀ 3.15–3.30 (*N* = 2).

Distribution. China (Xizang).

Comment. Judging from the broken vestige, we conclude it must have an epigynal scape.

Yaginumia qiong **Mi & Wang, sp. nov.**

https://zoobank.org/FC336132-DB32-4363-BB2D-D6F5851CEA47

Figs 3, 4, 7

Type material. ***Holotype*****:** CHINA – Hainan Province, • ♂; Lingshui Li Autonomous County, Diaoluoshan National Nature Reserve, Popular Science Base; 18°40.25'N, 109°53.66'E; ca 260 m elev.; 26.VII.2023; C. Wang et al. leg.; TRU-Araneidae-329. ***Paratypes*****:** 10♀♀; same data as for holotype; TRU-Araneidae-330–339 • 1♂; Ledong Li Autonomous County, Jianfeng Township, Jianfengling National Nature Reserve, Tianchi; 18°44.45'N, 108°51.49'E; ca 860 m elev.; 11.IV.2019; C. Wang & Y.F. Yang leg.; TRU-Araneidae-340 • 1♀; Ledong Li Autonomous County, Jianfeng Township, Jianfengling National Nature Reserve, Yulingu; 18°44.79'N, 108°55.76'E; ca 630 m elev.; 15.IV.2019; C. Wang & Y.F. Yang leg.; TRU-Araneidae-341 • 2♀♀; Ledong Li Autonomous County, Jianfeng Township, Jianfengling National Nature Reserve, Tianchi; 18°44.82'N, 108°51.64'E; ca 810 m elev.; 15.IV.2019; C. Wang & Y.F. Yang leg.; TRU-Araneidae-342–343.

Etymology. The species name is a noun in apposition derived from Chinese pinyin qiong, short name of the type locality, Hainan.

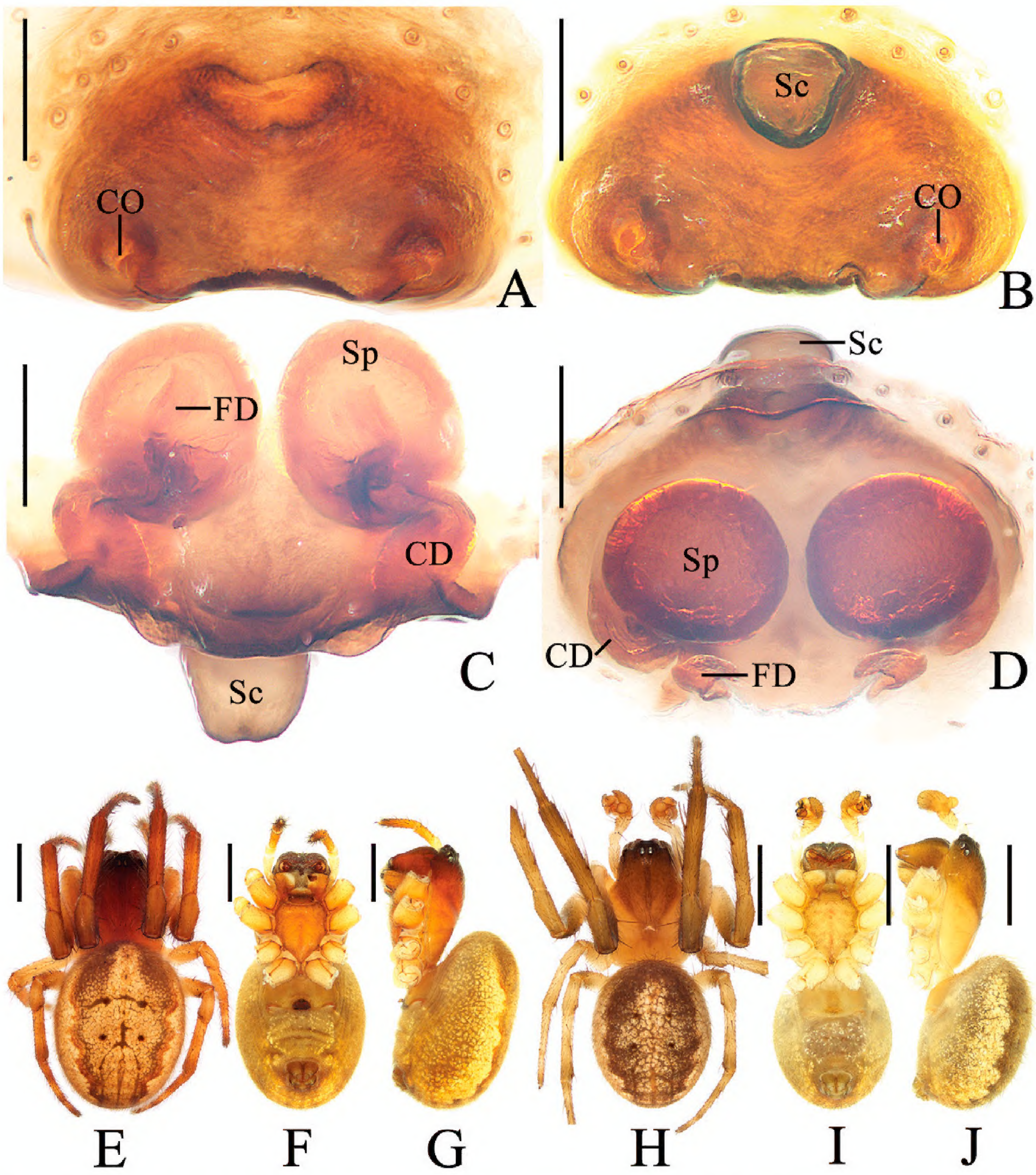

Figure 3. *Yaginumia qiong* Mi & Wang, sp. nov. **A** female paratype TRU-Araneidae-330 **B–G** female paratype TRU-Araneidae-341 **H–J** male holotype **A** epigyne (scape torn off), ventral view **B** ibid, ventral view **C** vulva, posterior view **D** ibid, dorsal view **E, H** habitus, dorsal view **F, I** ibid., ventral view **G, J** ibid., lateral view. Abbreviations: CD copulatory duct, CO copulatory opening, FD fertilization duct, Sc scape, Sp spermatheca. Scale bars: 0.1 mm (**A–D**); 1.0 mm (**E–J**).

Diagnosis. See diagnosis of *Y. medog* Mi & Wang, sp. nov.

Description. Male (holotype, Figs 3H–J, 4). Total length 3.95. Carapace 2.00 long, 1.50 wide. Abdomen 2.25 long, 1.80 wide. Clypeus 0.05 high. Eye sizes and interdistances: AME 0.13, ALE 0.08, PME 0.10, PLE 0.08, AME–AME 0.13, AME–ALE 0.10, PME–PME 0.04, PME–PLE 0.23, MOA length 0.33, anterior width 0.38, posterior width 0.24. Leg measurements: I 6.70 (1.90, 2.45, 1.60,

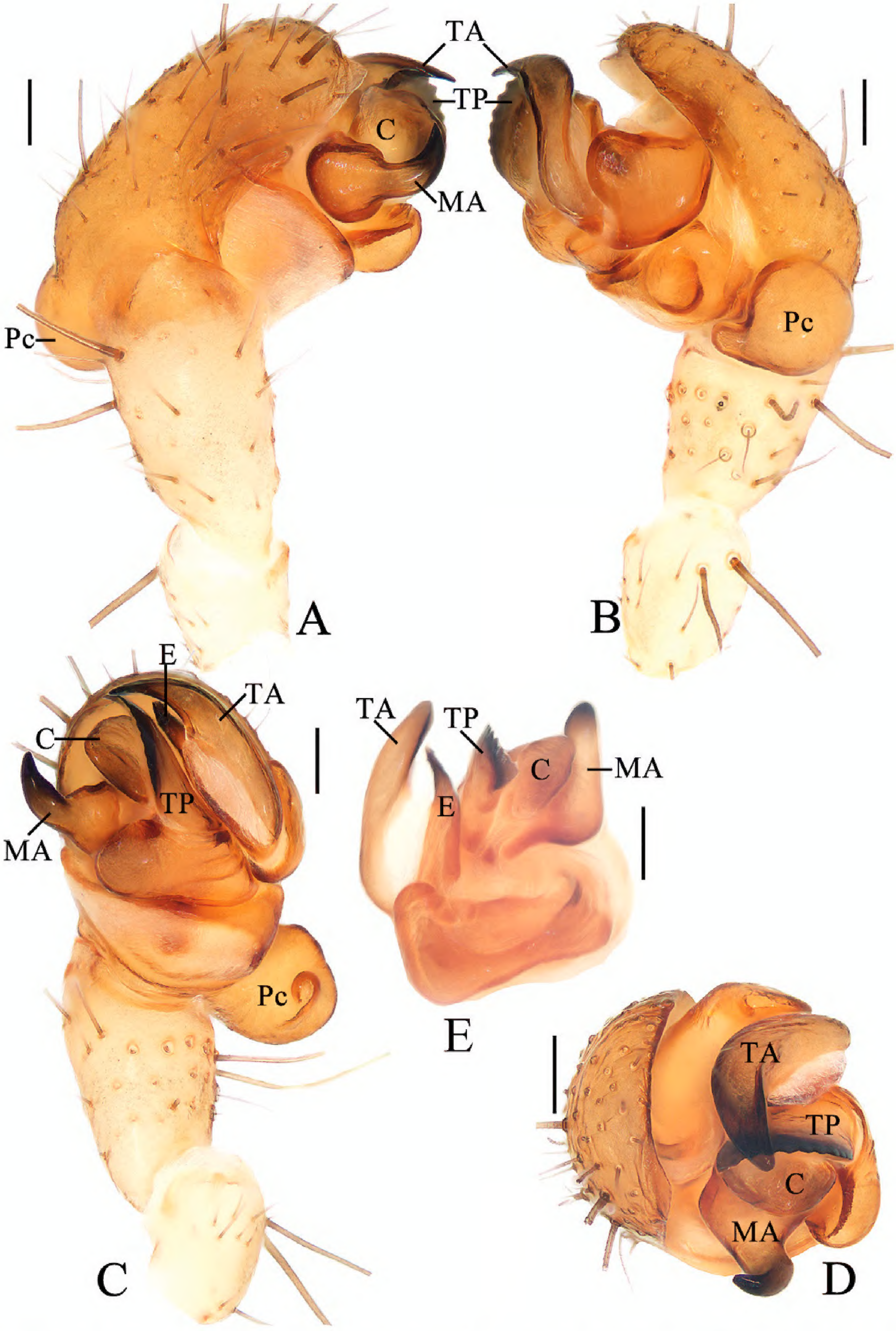

Figure 4. *Yaginumia qiong* Mi & Wang, sp. nov. male holotype **A** pedipalp, prolateral view **B** ibid., retrolateral view **C** ibid., ventral view **D** ibid., apical view **E** part of expanded bulb. Abbreviations: C conductor, E embolus, MA median apophysis, Pc paracymbium, TA terminal apophysis, TP tegular projection. Scale bars: 0.1 mm.

0.75), II 5.90 (1.75, 2.05, 1.40, 0.70), III 3.60 (1.15, 1.15, 0.80, 0.50), IV 4.65 (1.40, 1.60, 1.10, 0.55). Carapace red brown in cephalic region and yellow in thoracic region. Cervical groove conspicuous. Chelicerae yellowish-brown, with five promarginal and three retromarginal teeth. Endites and sternum yellow. Labium yellow at base, with paler tip. Legs yellow to grayish-yellow, without annuli. Abdomen ~1.25 × longer than wide, dorsum grayish-brown with paler middle patch. Venter abdomen grayish-yellow. Spinnerets grayish-yellow.

Pedipalp (Fig. 4): tibia ~1.5 × longer than wide; paracybium extremely enlarged into disc, lobe-like distally; tegular projection triangular, with toothed inner edge; median apophysis rounded at base, tapered and curled distally; embolus almost straight, shorter than conductor; conductor weakly sclerotized, rounded distally; terminal apophysis longer than tegular projection, curved to C-shape in apical view.

Female (paratype TRU-Araneidae-330, Fig. 3A, paratype TRU-Araneidae-341, Fig. 3B–G). Total length 4.55. Carapace 2.20 long, 1.75 wide. Abdomen 3.20 long, 2.40 wide. Clypeus 0.08 high. Eye sizes and interdistances: AME 0.13, ALE 0.08, PME 0.10, PLE 0.08, AME–AME 0.13, AME–ALE 0.13, PME–PME 0.05, PME–PLE 0.25, MOA length 0.30, anterior width 0.38, posterior width 0.25. Leg measurements: I 6.50 (1.90, 2.40, 1.55, 0.65), II 5.75 (1.70, 2.10, 1.35, 0.60), III 3.70 (1.15, 1.25, 0.80, 0.50), IV 5.05 (1.65, 1.80, 1.10, 0.50). Habitus similar to that of male.

Epigyne (Fig. 3A–D): ~1.71 × wider than long in ventral view, with short, tongue-shaped scape; copulatory openings rounded in ventral view, situated on ventral surface; copulatory ducts twisted, about equal length to spermathecal diameter; spermathecae rounded, nearly touching.

Variation. Total length: ♂♂ 3.85–3.95 (*N* = 2); ♀♀ 4.25–5.70 (*N* = 13).

Distribution. China (Hainan).

Yaginumia sia (Strand, 1906)

Figs 5–7

Aranea sia Strand, in Bösenberg and Strand 1906: 237, pl. 4, fig. 24 (♀); Song 1980: 94, fig. 40a–d (♂♀) (type material in Senckenberg Museum, Frankfurt am Main (SMF), Germany, not examined).

Araneus sia Yaginuma, 1960: 115, fig. 50.1–3; Lee 1966: 40, fig. 10m–o; Yaginuma 1971: 54, fig. 50.1–3 (♂♀); Yin 1978: 2, fig. 3A–D (♂♀); Hu 1984: 97, fig. 92.1–2 (♂♀); Zhao 1993: 233, fig. 107a–b (♂♀); Zhao 1995: 950, fig. 446a–b (♂♀).

Yaginumia sia Archer, 1960: 14, figs 1–4 (♂♀); Namkung et al. 1972: 93, fig. 11 (♀); Guo 1985: 75, fig. 2–27.1–3 (♂♀); Yaginuma 1986: 109, fig. 57.6 (♂♀); Zhang 1987: 89, fig. 73.1–4 (♂♀); Ishinoda 1989: 21, figs 12, 13 (♂♀); Chikuni 1989: 75, fig. 39 (♂♀); Feng 1990: 101, fig. 76.1–3 (♂♀); Chen and Gao 1990: 73, fig. 92a–c (♂♀); Chen and Zhang 1991: 91, fig. 82.1–3 (♂♀); Zhao 1993: 262, fig. 123a, b (♂♀); Zhao 1995: 979, fig. 462a, b (♂♀); Yin et al. 1997: 395, fig. 286a–d (♂♀); Song et al. 1999: 309, figs 184G–I, 185L (♂♀); Namkung 2002: 303, fig. 19.64a, b (♂♀); Kim and Kim 2002: 225, figs 69, 155, 288, 289 (♂♀); Kim and Cho 2002: 270, figs 685–690 (♀); Namkung 2003: 305, fig. 19.64a, b (♂♀); Tanikawa 2007: 93, figs 299, 300, 760–763 (♂♀); Tanikawa 2009: 463, figs 331–334 (♂♀); Zhu and Zhang 2011: 248, fig. 179A–D (♂♀); Yin et al. 2012: 762, fig. 381a–e (♂♀); Kim and Lee 2012: 109, fig. 81A–C, plate 24 (♂♀); Baba and Tanikawa 2015: 69, 4 fig. (♂♀).

Material examined. CHINA – Guizhou Province • 2♂♂4♀♀; Tongren City, Shiqian County, Pingshan Township, Fodingshan Village, Yaoshang; 27°20.54'N, 108°9.50'E; ca 640 m elev.; 11.VII.2017; X.Q. Mi et al. leg.; TRU-Araneidae-344–349 • 2♂♂24♀♀; Tongren City, Bijiang District, Chuangdong Township, around campus of Tongren University; 27°46.66'N, 109°13.00'E; ca 570 m elev.; 7–15.VII.2017; L.F. Chen et al. leg.; TRU-Araneidae-350–375 • 3♂♂10♀♀; Qiandongnan Miao and Dong Autonomous Prefecture, Shibing County, Baiduo Township, Baiduo Village, Heichong; 27°9.37'N, 108°7.40'E; ca 980 m elev., 20.VII.2019; X.Q. Mi et al. leg.; TRU-Araneidae-376–388 • 4♂♂2♀♀; Zunyi City, Huichuan District, Banqiao Township, Loushanguan Village; 27°58.06'N, 106°53.20'E; ca 920 m elev.; 17.VII.2024; X.Q. Mi leg.; TRU-Araneidae-389–394. – Hubei Province • 4♂♂12♀♀; Wuhan City, Hongshan District, Ma'anshan Forest Park; 30°31.65'N, 114°26.12'E; ca 30 m elev.; 3.VI.2018; X.Q. Mi leg.; TRU-Araneidae-395–410.

Diagnosis. This species resembles *Y. medog* Mi & Wang, sp. nov. in appearance and genitalia structures, but it can be distinguished as follows: 1) median apophysis with a projection on middle part (Fig. 6A, C–E) vs lacking (Fig. 2A, C–E); 2) median apophysis curled about 45° in ventral view (Fig. 6C) vs about 90° (Fig. 2C); 3) copulatory openings almost rounded in ventral view (Fig. 5A, B) vs arcuate (Fig. 1A); and 4) diameter of spermathecae about 1/4 width of epigynal base (Fig. 5D) vs about 2/5 width of epigynal base (Fig. 1D).

Description. Male (TRU-Araneidae-350, Figs 5H–J, 6). Total length 6.30. Carapace 3.30 long, 2.50 wide. Abdomen 3.70 long, 2.60 wide. Clypeus 0.08 high. Eye sizes and interdistances: AME 0.18, ALE 0.10, PME 0.13, PLE 0.10, AME–AME 0.15, AME–ALE 0.28, PME–PME 0.05, PME–PLE 0.45, MOA length 0.48, anterior width 0.48, posterior width 0.30. Leg measurements: I 13.30 (3.70, 5.10, 3.20, 1.30), II 11.60 (3.20, 4.20, 3.00, 1.20), III 6.50 (2.10, 2.10, 1.50, 0.80), IV 9.10 (2.70, 3.30, 2.20, 0.90). Carapace dark brown in cephalic region and yellowish-brown in thoracic region. Cervical groove conspicuous. Chelicerae dark brown, with four promarginal and three retromarginal teeth. Endites and labium dark brown at base, with paler tip. Sternum yellowish-brown. Legs yellow with brown annuli. Abdomen ~1.42 × longer than wide, dorsal grayish-brown with paler edges. Venter abdomen grayish-yellow with pair of lateral white patches. Spinnerets grayish-yellow.

Pedipalp (Fig. 6): tibia ~1.96 × longer than wide in ventral view; paracybium enlarged at base, lobe-like distally; tegular projection triangular, with serrated edge; median apophysis wide at base, with projection at middle part, tapered and curled distally; embolus slightly curled, shorter than conductor; conductor membranous, longer than wide; terminal apophysis with weakly sclerotized distal portion, about equal length to tegular projection.

Female (TRU-Araneidae-351, Fig. 5A, TRU-Araneidae-352, Fig. 5B–G). Total length 7.00. Carapace 3.00 long, 2.80 wide. Abdomen 4.30 long, 3.30 wide. Clypeus 0.08 high. Eye sizes and interdistances: AME 0.18, ALE 0.10, PME 0.13, PLE 0.10, AME–AME 0.15, AME–ALE 0.25, PME–PME 0.05, PME–PLE 0.45, MOA length 0.45, anterior width 0.45, posterior width 0.30. Leg measurements: I 11.90 (3.40, 4.40, 3.00, 1.10), II 10.30 (3.00, 3.80, 2.50, 1.00), III 6.20 (2.00, 2.20, 1.30, 0.70), IV 8.90 (2.80, 3.20, 1.90, 1.00). Habitus similar to that of male.

Epigyne (Fig. 5A–D): ~1.55 × wider than long in ventral view, with heart-shaped scape; copulatory openings rounded, situated on ventral surface; copulatory ducts twisted, a bit longer than spermathecal diameter; spermathecae rounded, touching.

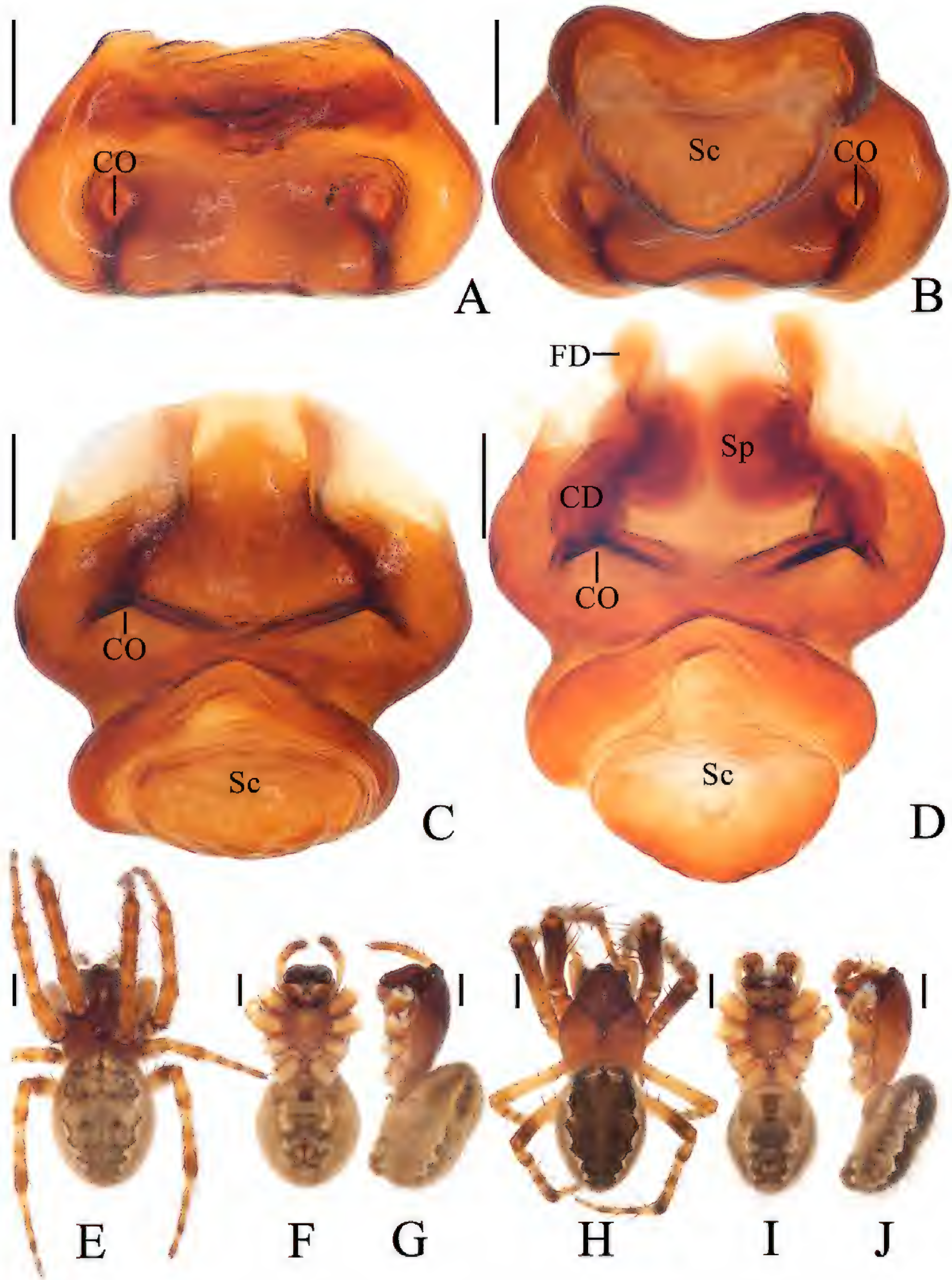

Figure 5. *Yaginumia sia* (Strand, 1906) **A** TRU-Araneidae-351 **B–G** TRU-Araneidae-352 **H–J** TRU-Araneidae-350 **A** epigyne (scape torn off), ventral view **B** ibid, ventral view **C** ibid., posterior view **D** vulva, posterior view **E, H** habitus, dorsal view **F, I** ibid., ventral view **G, J** ibid., lateral view. Abbreviations: CD copulatory duct, CO copulatory opening, FD fertilization duct, Sc scape, Sp spermatheca. Scale bars: 0.1 mm (**A–D**); 1.0 mm (**E–J**).

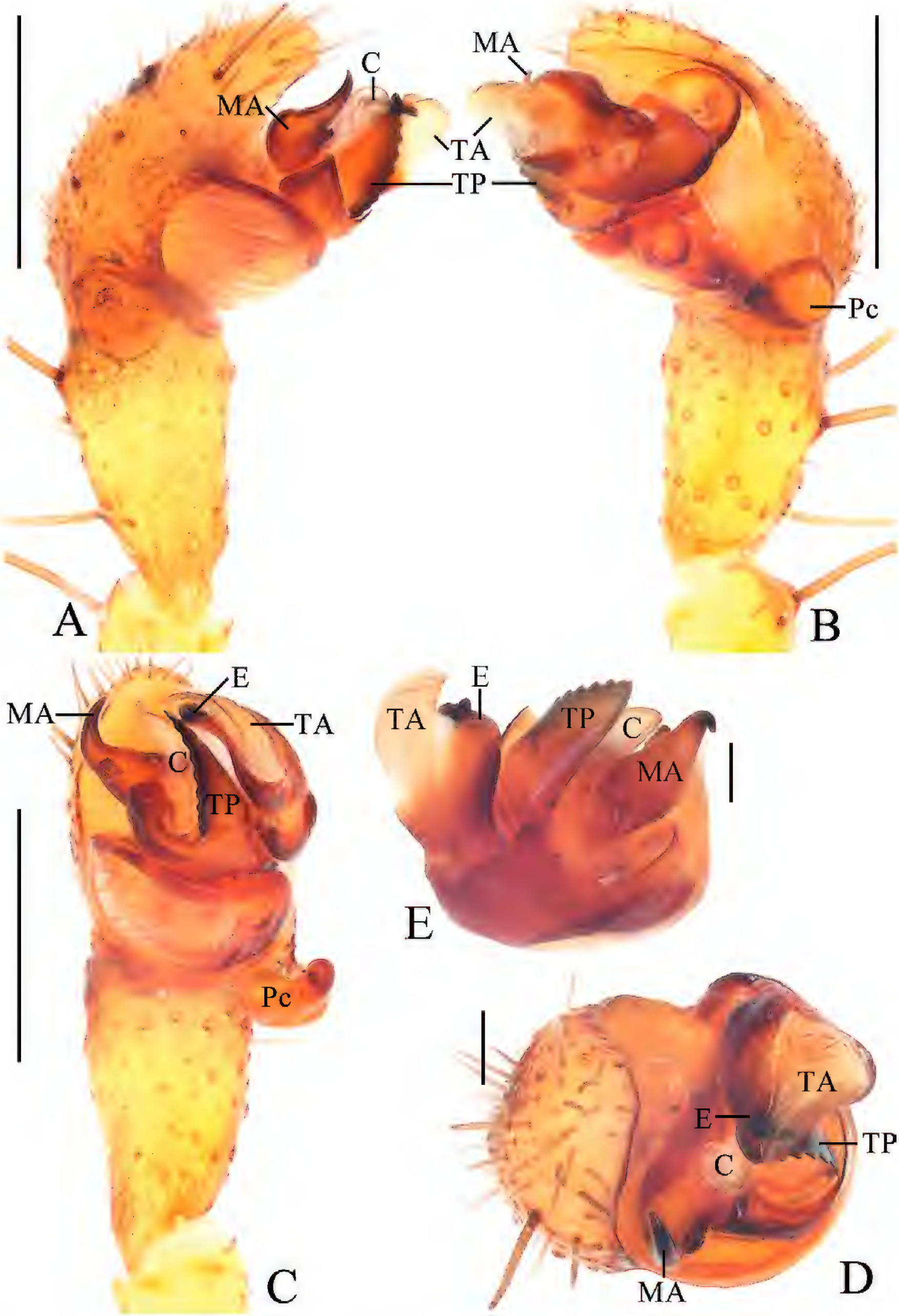

Figure 6. *Yaginumia sia* (Strand, 1906) TRU-Araneidae-350 **A** pedipalp, prolateral view **B** ibid., retrolateral view **C** ibid., ventral view **D** ibid., apical view **E** part of expanded bulb. Abbreviations: C conductor, E embolus, MA median apophysis, Pc paracymbium, TA terminal apophysis, TP tegular projection. Scale bars: 0.5 mm (**A–C**), 0.1 mm (**D, E**).

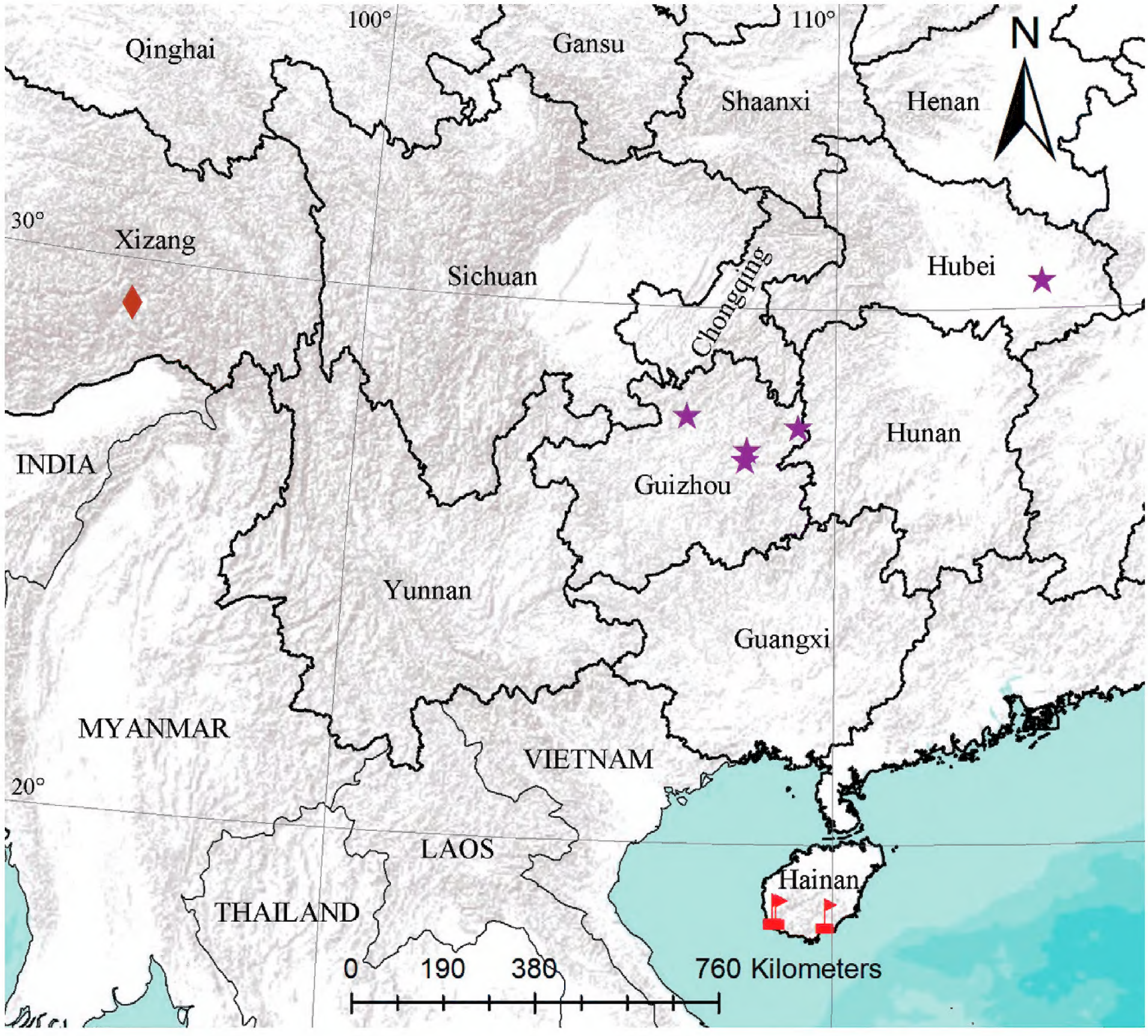

Figure 7. Distribution in China of the examined specimens of *Yaginumia*.

Variation. Total length: ♂♂ 5.60–8.20 (*N* = 15); ♀♀ 5.80–13.10 (*N* = 52). Scape torn off in most individuals.

Distribution. China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Shandong, Sichuan, Taiwan, Xinjiang, Zhejiang), Korea, Japan.

Discussion

According to the literature and our fieldwork experience, *Y. sia* shows a high propensity to live close to humans; the specimens were collected in houses, under the eaves, around bridges, rice fields and cotton fields; it is widely distributed in eastern Asia, human activities may influence its distribution. However, the two new *Yaginumia* species were collected from low shrubs and didn't show the propensity to live close to humans.

The edges of the pedipalpal tegulum of most araneids are rounded and almost smooth, or with low ridges in some species; a long tegular process is rarely found in araneids. Levi (1974) introduced the term "projection of tegulum" for *Y. sia* for the first time; although the long tegular projection looks like a conductor, it is an extension of the tegulum, and the conductor is a structure of the outer bulb close to the tegulum. A long tegular projection was also described in some Chinese araneids species, such as *Hypsosinga alboria* Yin, Wang, Xie & Peng, 1990, *H. sanguinea* (C. L. Koch, 1844), *Larinia astrigera* Yin, Wang, Xie & Peng, 1990, *L. cyclera* Yin, Wang, Xie & Peng, 1990, *L. dinanea* Yin, Wang, Xie & Peng, 1990, *L. elegans* Spassky, 1939, *L. nolabelia* Yin, Wang, Xie & Peng, 1990, *L. phthisica* (L. Koch, 1871), *L. wenshanensis* Yin & Yan, 1994, and *Lariniaria argiopiformis* (Bösenberg & Strand, 1906).

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Data availability

All of the data that support the findings of this study are available in the main text.

References

Archer A (1960) A new genus of Argiopidae from Japan. Acta Arachnologica 17(1): 13–14. https://doi.org/10.2476/asjaa.17.13

Baba Y, Tanikawa A (2015) The handbook of spiders. Bun-ichi Sogo Shuppan, Tokyo, 112 pp.

Bösenberg W, Strand E (1906) Japanische Spinnen. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft 30: 93–422.

Chen X, Gao J (1990) The Sichuan farmland spiders in China. Sichuan Science and Technology Publishing House, Chengdu, 226 pp.

Chen Z, Zhang Z (1991) Fauna of Zhejiang: Araneida. Zhejiang Science and Technology Publishing House, Hangzhou, 356 pp.

Chikuni Y (1989) Pictorial encyclopedia of spiders in Japan. Kaisei-sha Publishing Co., Tokyo, 310 pp.

Feng Z (1990) Spiders of China in colour. Hunan Science and Technology Publishing House, 256 pp.

Gregorič M, Agnarsson I, Blackledge T, Kuntner M (2015) Phylogenetic position and composition of Zygiellinae and *Caerostris*, with new insight into the orb-web evolution and gigantism. Zoological Journal of the Linnean Society 175: 225–243. https://doi.org/10.1111/zoj.12281

Guo J [Ed.] (1985) Farm spiders from Shaanxi Province. Shaanxi Science and Technology Press, 227 pp.

Hu J (1984) The Chinese spiders collected from the fields and the forests. Tianjin Science and Technology Press, 482 pp.

Ishinoda T (1989) Studies on the ecology, distribution of the Japanese spider (Zuguro-onigumo): *Yaginumia sia* (Strand, 1906). Heptathela 4: 21–30.

Kallal R, Hormiga G (2018) Systematics, phylogeny and biogeography of the Australasian leaf-curling orb-weaving spiders (Araneae: Araneidae: Zygiellinae), with comparative analysis of retreat evolution. Zoological Journal of the Linnean Society 184: 1055–1141. https://doi.org/10.1093/zoolinnean/zly014

Kallal R, Dimitrov D, Arnedo M, Giribet G, Hormiga G (2020) Monophyly, taxon sampling, and the nature of ranks in the classification of orb-weaving spiders (Araneae: Araneoidea). Systematic Biology 69(2): 401–411. https://doi.org/10.1093/sysbio/syz043

Kim J, Cho J (2002) Spider: Natural Enemy & Resources. Korea Research Institute of Bioscience and Biotechnology (KRIBB), 424 pp.

Kim J, Kim, J (2002) A revisional study of family Araneidae Dahl, 1912 (Arachnida, Araneae) from Korea. Korean Arachnology 18: 171–266.

Kim S, Lee S (2012) Arthropoda: Arachnida: Araneae: Araneidae. Araneid spiders. Invertebrate Fauna of Korea 21(16): 1–146.

Lee C (1966) Spiders of Formosa (Taiwan). Taichung Junior Teachers College Publisher, 84 pp.

Levi H (1974) The orb-weaver genus *Zygiella* (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology 146(5): 267–290.

Mi X, Wang C, Gan J (2023) Six new species of the orb-weaver spider genus *Araneus* Clerck, 1757 (Araneae, Araneidae) and a redescription of *A. colubrinus* Song & Zhu, 1992 from Fanjingshan National Nature Reserve, Guizhou, China. ZooKeys 1173: 243–273. https://doi.org/10.3897/zookeys.1173.106315

Namkung J (2002) The spiders of Korea. Kyo-Hak Publishing Co., Seoul, 648 pp. [2001 in the book, but publ. in 2002 per Platnick]

Namkung J (2003) The Spiders of Korea, 2nd edn. Kyo-Hak Publishing Co., Seoul, 648 pp.

Namkung J, Paik W, Yoon K (1972) The spider fauna of Mt. Jiri, Cholla-namdo, Korea. Korean Journal of Plant Protection 11: 91–99.

Roewer C (1942) Katalog der Araneae von 1758 bis 1940. 1. Band (Mesothelae, Orthognatha, Labidognatha: Dysderaeformia, Scytodiformia, Pholciformia, Zodariiformia, Hersiliaeformia, Argyopiformia). Natura, Buchhandlung für Naturkunde und exakte Wissenschaften Paul Budy, Bremen, 1040 pp.

Saitō S (1959) The Spider Book Illustrated in Colours. Hokuryukan, Tokyo, 194 pp.

Song D [Ed.] (1980) Farm Spiders. Science Press, Beijing, 247 pp.

Song D, Zhu M, Chen J (1999) The spiders of China. Hebei Science and Technology Publishing House, Shijiazhuang, 640 pp.

Tanikawa A (2007) An identification guide to the Japanese spiders of the families Araneidae, Nephilidae and Tetragnathidae. Arachnological Society of Japan, 121 pp.

Tanikawa A (2009) Hersiliidae. Nephilidae, Tetragnathidae, Araneidae. In: Ono H (Ed.) The spiders of Japan with keys to the families and genera and illustrations of the species. Tokai University Press, Kanagawa, 149, 403–463.

WSC (2024) World Spider Catalog, version 25.5. Natural History Museum Bern. [accessed on 2024-10-15] https://doi.org/10.24436/2

Yaginuma T (1960) Spiders of Japan in colour. Hoikusha, Osaka, 186 pp.

Yaginuma T (1971) Spiders of Japan in colour (enlarged and revised edition). Hoikusha, Osaka (for 1969), 197 pp.

Yaginuma T (1986) Spiders of Japan in color (new ed.). Hoikusha Publishing Co., Osaka, 305 pp., 64 plates.

Yin C (1978) A study on the general orb-weaver spiders and wolf-spiders (Araneae: Araneidae, Lycosidae) from rice fields. Journal of Hunan Teachers College [nat. Sci. Ed.] 1978(10): 1–21.

Yin C, Wang J, Zhu M, Xie L, Peng X, Bao Y (1997) Fauna Sinica: Arachnida: Araneae: Araneidae. Science Press, Beijing, 460 pp.

Yin C, Peng X, Yan H, Bao Y, Xu X, Tang G, Zhou Q, Liu P (2012) Fauna Hunan: Araneae in Hunan, China. Hunan Science and Technology Press, Changsha, 1590 pp.

Zhang W [Ed.] (1987) Farm spiders from Hebei Province. Hebei University of Science and Technology Press, 299 pp.

Zhao J (1993) Spiders in the cotton fields in China. Wuhan Publishing House, Wuhan, China, 552 pp.

Zhao J (1995) Araneida. In: Natural enemies of cotton pests in China. Wuhan Publishing House, Wuhan, China, 762–1155.

Zhu M, Zhang B (2011) Spider Fauna of Henan: Arachnida: Araneae. Science Press, Beijing, 558 pp.

Zhu M, Song D, Zhang J (2003) Fauna Sinica: Invertebrata Vol. 35: Arachnida: Araneae: Tetragnathidae. Science Press, Beijing, 418 pp.